Educational environment and the improvement in the General Medicine In#training Examination score

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LETTER TO THE EDITOR

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Educational environment and the improvement in the General Medicine In-training Examination score

Dear Editor:

We investigated the association between the educational environment and performance in the General Medicine In-training Examination (GM-ITE) among postgraduate year (PGY)-1 and -2 resident physicians in Japanese teaching hospitals since 2012. GM-ITE includes 100 questions designed by a committee comprised of experts organized by the Japan Organization of Advancing Medical Education Program.[1] According to our previous report[1], hospitals with a general medicine (GM) department or those located in a provincial community had significantly higher GM-ITE score compared with the other hospitals. Data from the 2013 GM-ITE showed that appropriate emergency department (ED) workload, inpatient caseload, and online learning resource were associated with greater clinical knowledge.[2] In addition, in 2014, we found that factors affecting hospital volume, including the number of hospitalizations, had a positive impact on GM-ITE scores.[3] While our team have been extensively studied factors related to the performance of the GM-ITE, because previous studies were analyzing cross-sectional data, we could not evaluate the improvement in GM-ITE score over time. In this context, we investigate how educational environment of hospitals is related to the improvement in GM-ITE score using the longitudinal data obtained during two consecutive years.

We analyzed GM-ITE scores of 241 resident physicians affiliated to 46 Japanese teaching hospitals (42 community and four university hospitals, age 26.8±3.0 years, 176 males and 65 females) underwent GM-ITE in 2013 and 2014. university hospitalswere collected using a self-reporting questionnaire sheet, the Residency Electronic Information System website, and the Foundation for the Promotion of Medical Training website. We examined the association between the educational environment and changes in the GM-ITE score (PGY-2 score minus PGY-1 score) using hierarchical linear regression models. The covariates with $P<.10$ on the univariable analysis were included in our multivariable model (Table 1).

Our results showed that age, the number of ED duty (3-5 or ≥6 per month), and the number of inpatients the resident was responsible for (monthly average 5-9) were associated with the improvement in GM-ITE scores (Table 1). A previous study showed that a heavy call rotation (every fourth or fifth night) was related to postcall performance impairment.[4] Overnight calls were associated with higher burnout and fatigue scores.[5] Recently, there has been a trend for limiting workloads for residents because there might have been relationship between an excessive workload and higher risk at burnout.

TABLE 1 Association between educational environment and change in GM-ITE scores (PGY-2 minus PGY-1)

	Univariable analysis				Multivariable analysis[a]			
		95% CI				95% CI		
Variable	Estimate (the improvement in GM-ITE score)	Lower limit	Upper limit	*P*-value	Estimate (the improvement in GM-ITE score)	Lower limit	Upper limit	*P*-value
Hospital-level variables								
Community hospital (vs. university hospital)	0.15	−3.97	4.28	.94				
Number of hospital beds (per 100 increase)	−0.47	−1.35	0.42	.30				
Number of physicians (per 100 increase)	−0.18	−1.08	0.73	.70				
Located in urban area (vs provincial)	1.24	−1.70	4.18	.41				
GIM/GM (vs no GIM/GM)	1.00	−2.16	4.15	.53				
Salary (Japanese 10 000 yen)	−0.16	−0.35	0.03	.11				
Area of library (100 mm^2)	0.01	−0.16	0.19	.91				
Number of books in library (per 10 000 increase)	0.01	−0.18	0.20	.92				
Doctor-level variables								
Age (year)	0.47	0.13	0.81	.01**	0.46	0.05	0.88	.03**
Male	−0.25	−2.45	1.96	.83				
ED duty per month[b]								
0	1	Reference						
1-2	1.65	−2.31	5.62	.41	4.17	−0.37	8.71	.07*
3-5	2.45	0.41	4.50	.02**	3.42	1.46	5.37	<.01**

(Continues)

TABLE 1 (Continued)

Variable	Univariable analysis				Multivariable analysis[a]			
	Estimate (the improvement in GM-ITE score)	95% CI		*P*-value	Estimate (the improvement in GM-ITE score)	95% CI		*P*-value
		Lower limit	Upper limit			Lower limit	Upper limit	
6 or greater	2.15	−0.77	5.07	.15	3.69	1.11	6.27	.01**
Unknown	8.34	3.69	13.00	<.01**	7.57	1.46	13.68	.02**
Number of inpatients in charge[b]								
0-4	1	Reference						
5-9	2.62	0.24	5.00	.03**	3.17	0.51	5.82	.02**
10-14	2.02	−1.42	5.46	.25	2.15	−1.65	5.95	.27
15 or greater	−0.58	−4.42	3.26	.76	−1.77	−6.77	3.22	.48
Unknown	1.89	−7.27	11.06	.68	3.03	−2.11	8.17	.25
Study time (min)[b]								
0-30	1	Reference						
31-60	−0.99	−4.34	2.35	.56				
61-90	0.65	−2.69	3.98	.70				
91 or greater	−1.71	−4.83	1.41	.28				
Unknown	−0.59	−11.80	10.63	.92				

CI, confidence interval; NS, not significant; GIM, general internal medicine; GM, general medicine; ED, emergency department.
[a]Estimate of hospital random-effects variance =6.42 (*P*=0.09).
[b]F-test with 4 degrees of freedom for univariable analysis: *P*<.01 for ED duty per month, *P*=0.07 for the number of inpatients the resident was in charge of, and *P*=0.27 for study time.
*$P<.1$.
**$P<.05$.

Here hospitals with a GM department were not significantly related to the improvement in GM-ITE scores. Therefore, we presume that the resident physicians did not receive sufficient periods of GM residency.

The main limitation of the present study was a small sample size. Although the total number of participants was 1049 and 2015 in 2013 and 2014, respectively, only 241 participants undertook GM-ITE during the studied years. Another problem is the possibility of ceiling effect in participants achieving a high score in PGY-1. The difference in scores (PGY-2 minus PGY-1) tended to be smaller when participants achieved a high score in PGY-1. Finally, the information on ED duty, obtained from the self-reporting questionnaire sheet, was simply the number of overnight calls per month, and it could not be used to assess the difference in the system of emergency department of each hospital. Also, the number of inpatients in charge obtained from the self-reporting questionnaire sheet was simply the average number of inpatients in charge, and it could not be used to assess the difference in the system of the specialties the residents rotated on.

CONFLICT OF INTEREST

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

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REFERENCES

1. Shimizu T, Tsugawa Y, Tanoue Y, et al. The hospital educational environment and performance of residents in the General Medicine In-Training Examination: a multicenter study in Japan. Int J Gen Med. 2013;6:637–40.
2. Kinoshita K, Tsugawa Y, Shimizu T, et al. Impact of inpatient caseload, emergency department duties, and online learning resource on General Medicine In-Training Examination scores in Japan. Int J Gen Med. 2015;8:355–60.
3. Mizuno A, Tsugawa Y, Shimizu T, et al. The Impact of the hospital volume on the performance of residents on the general medicine in-training examination: a multicenter study in Japan. Intern Med. 2016;55:1553–8.
4. Arnedt JT, Owens J, Crouch M, Stahl J, Carskadon MA. Neurobehavioral performance of residents after heavy night call vs after alcohol ingestion. JAMA. 2005;294:1025–33.
5. Block L, Wu AW, Feldman L, Yeh HC, Desai SV. Residency schedule, burnout and patient care among first-year residents. Postgrad Med J. 2013;89:495–500.